

Title (en)

ANTI-CGRP COMPOSITIONS AND USE THEREOF

Title (de)

ANTI-CGRP-ZUSAMMENSETZUNGEN UND VERWENDUNG DAVON

Title (fr)

COMPOSITIONS ANTI-CGRP ET LEUR UTILISATION

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Abstract (en)

The present invention is directed to antibodies and fragments thereof having binding specificity for CGRP. Another embodiment of this invention relates to the antibodies described herein, and binding fragments thereof, comprising the sequences of the V, Vand CDR polypeptides described herein, and the polynucleotides encoding them. The invention also contemplates conjugates of anti-CGRP antibodies and binding fragments thereof conjugated to one or more functional or detectable moieties. The invention also contemplates methods of making said anti-CGRP antibodies and binding fragments thereof. Embodiments of the invention also pertain to the use of anti-CGRP antibodies, and binding fragments thereof, for the diagnosis, assessment and treatment of diseases and disorders associated with CGRP.

IPC 8 full level

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Citation (applicant)

- WO 2011024113 A1 20110303 - RINAT NEUROSCIENCE CORP [US], et al
- US 5624659 A 19970429 - BIGNER DARELL D [US], et al
- US 6187287 B1 20010213 - LEUNG SHUI-ON [US], et al
- US 4179337 A 19791218 - DAVIS FRANK F [US], et al
- US 5643575 A 19970701 - MARTINEZ ANTHONY [US], et al
- EP 0401384 A1 19901212 - KIRIN AMGEN INC [US]
- US 5876969 A 19990302 - FLEER REINHARD [FR], et al
- EP 0413622 A1 19910220 - RHONE POULENC SANTE [FR]
- US 5766883 A 19980616 - BALLANCE DAVID J [GB], et al
- EP 0322094 A1 19890628 - DELTA BIOTECHNOLOGY LTD [GB]
- US 6653104 B2 20031125 - GOLDENBERG DAVID M [US]
- US 2007269868 A1 20071122 - CARVALHO JENSEN ANNE E [US], et al
- US 5627052 A 19970506 - SCHRADER JOHN W [CA]
- US 2009022659 A1 20090122 - OLSON KATIE [US], et al
- US 7935340 B2 20110503 - GARCIA-MARTINEZ LEON [US], et al
- US 4816567 A 19890328 - CABILLY SHMUEL [US], et al
- US 5530101 A 19960625 - QUEEN CARY L [US], et al
- US 5585089 A 19961217 - QUEEN CARY L [US], et al
- US 5693762 A 19971202 - QUEEN CARY L [US], et al
- US 6180370 B1 20010130 - QUEEN CARY L [US], et al
- US 5225539 A 19930706 - WINTER GREGORY P [GB]
- US 6548640 B1 20030415 - WINTER GREGORY PAUL [GB]
- US 6054297 A 20000425 - CARTER PAUL J [US], et al
- US 6407213 B1 20020618 - CARTER PAUL J [US], et al
- US 6639055 B1 20031028 - CARTER PAUL J [US], et al
- US 6632927 B2 20031014 - ADAIR JOHN ROBERT [GB], et al
- US 5616601 A 19970401 - KHANNA ISH K [US], et al
- US 5604260 A 19970218 - GUAY DANIEL [CA], et al
- US 5593994 A 19970114 - BATT DOUGLAS G [US], et al
- US 5550142 A 19960827 - DUCHARME YVES [CA], et al
- US 5536752 A 19960716 - DUCHARME YVES [CA], et al
- US 5521213 A 19960528 - PRASIT PETPIBOON [CA], et al
- US 5475995 A 19951219 - LIVINGSTON GEORGE G [US]
- US 5639780 A 19970617 - LAU CHEUK KUN [CA], et al
- US 5604253 A 19970218 - LAU CHEUK K [CA], et al
- US 5552422 A 19960903 - GAUTHIER JACQUES Y [CA], et al
- US 5510368 A 19960423 - LAU CHEUK K [CA], et al
- US 5436265 A 19950725 - BLACK CAMERON [CA], et al
- US 5409944 A 19950425 - BLACK W CAMERON [CA], et al
- US 5130311 A 19920714 - GUILLAUMET GERALD [FR], et al
- US 80141206 P 20060519
- US 2008064421 W 20080521
- WO 2008144757 A1 20081127 - ALDER BIOPHARMACEUTICALS INC [US], et al
- US 42905306 A 20060508

- US 2006270045 A1 20061130 - CREGG JAMES M [US], et al
- DOODS, H., CURR. OP. INVEST. DRUGS, vol. 2, no. 9, 2001, pages 1261 - 68
- DURHAM, P.L., NEW ENG. J. MED., vol. 350, no. 11, 2004, pages 1073 - 75
- ARULMOZHI, D.K. ET AL., VAS. PHARMA., vol. 43, 2005, pages 176 - 187
- WHARTON ET AL., NEUROSCI, vol. 3, 1986, pages 727
- YOSHIDA ET AL., J PHARMACOL SCI, vol. 112, 2011, pages 128
- CHUANG ET AL., J UROL, vol. 172, 2004, pages 1529
- CHUANG ET AL., J UROL, vol. 182, 2009, pages 786
- BURKE, D.; DAWSON, D.; STEARNS, T.: "Methods in yeast genetics: a Cold Spring Harbor Laboratory course manual", 2000, COLD SPRING HARBOR LABORATORY PRESS
- CREGG ET AL., MOL. CELL. BIOL., vol. 5, 1985, pages 3376 - 3385
- CREGG ET AL., MOL. CELL. BIOL., vol. 9, 1989, pages 1316 - 1323
- MENENDEZ ET AL., YEAST, vol. 20, no. 13, 2003, pages 1097 - 108
- WATERHAM ET AL., GENE, vol. 186, no. 1, 1997, pages 37 - 44
- SHEN ET AL., GENE, vol. 216, no. 1, 1998, pages 93 - 102
- HASHIMOTO, PROTEIN ENG, vol. 11, no. 2, 1998, pages 75
- KOBAYASHI, THERAPEUTIC APHERESIS, vol. 2, no. 4, 1998, pages 257
- LANDY, ANN.REV.BIOCHEM., vol. 58, 1989, pages 913 - 949
- WEISBERG; LANDY: "Lambda II", 1983, COLD SPRING HARBOR PRESS, article "Site-Specific Recombination in Phage Lambda", pages: 211 - 250
- STRELTSOV VA ET AL.: "Structure of a shark IgNAR antibody variable domain and modeling of an early-developmental isotype", PROTEIN SCI., vol. 14, no. 11, November 2005 (2005-11-01), pages 2901 - 9, XP055033681, DOI: doi:10.1110/ps.051709505
- GREENBERG AS ET AL.: "A new antigen receptor gene family that undergoes rearrangement and extensive somatic diversification in sharks", NATURE, vol. 374, no. 6518, 9 March 1995 (1995-03-09), pages 168 - 73, XP002245381, DOI: doi:10.1038/374168a0
- NUTTALL SD ET AL.: "Isolation of the new antigen receptor from wobbegong sharks, and use as a scaffold for the display of protein loop libraries", MOL IMMUNOL., vol. 38, no. 4, August 2001 (2001-08-01), pages 313 - 26, XP001152503, DOI: doi:10.1016/S0026-5890(01)00057-8
- HAMERS-CASTERMAN C ET AL.: "Naturally occurring antibodies devoid of light chains", NATURE, vol. 363, no. 6428, 3 June 1993 (1993-06-03), pages 446 - 8, XP002535892, DOI: doi:10.1038/363446a0
- GILL DS ET AL.: "Biopharmaceutical drug discovery using novel protein scaffolds", CURR OPIN BIOTECHNOL., vol. 17, no. 6, December 2006 (2006-12-01), pages 653 - 8, XP024962817, DOI: doi:10.1016/j.copbio.2006.10.003
- VAN BRUNT, BIO/TECHNOL., vol. 8, no. 4, 1990, pages 291 - 294
- EDELMAN, G. M., ANN. N.Y. ACAD. SCI., vol. 190, no. 5, 1971
- KABAT, E. A.: "Structural Concepts in Immunology and Immunochemistry", 1976, pages: 413 - 436
- ANDREWS, D. W. ET AL.: "Clinical Immunobiology", 1980, W. B. SANDERS, pages: 1 - 18
- KOHL, S. ET AL., IMMUNOLOGY, vol. 48, 1983, pages 187
- KABAT, E. A. ET AL.: "Sequences of Proteins of Immunological Interest", 1987, NATIONAL INSTITUTES OF HEALTH
- KABAT E. ET AL.: "Sequences of Proteins of Immunological Interest", 1983, US DEPT. OF HEALTH AND HUMAN SERVICES
- CHOHTHIA; LESK, J MOL. BIOL., vol. 196, 1987, pages 901 - 917
- KASHMIRI, S., METHODS, vol. 36, 2005, pages 25 - 34
- MORPURGO ET AL., APPL. BIOCHEM. BIOTECHNOL., vol. 56, 1996, pages 59 - 72
- VOROBJEV ET AL., NUCLEOSIDES NUCLEOTIDES, vol. 18, 1999, pages 2745 - 2750
- CALICETI ET AL., BIOCONJUG. CHEM., vol. 10, 1999, pages 638 - 646
- MALIK ET AL., EXP. HEMATOL., vol. 20, 1992, pages 1028 - 1035
- YOULE ET AL., PROC. NAT'L ACAD. SCI. USA, vol. 77, 1980, pages 5483
- GILLILAND ET AL., PROC. NAT'L ACAD. SCI. USA, vol. 77, 1980, pages 4539
- KROLICK ET AL., PROC. NAT'L ACAD. SCI. USA, vol. 77, 1980, pages 5419
- HUNTER ET AL., NATURE, vol. 144, 1962, pages 945
- DAVID ET AL., BIOCHEMISTRY, vol. 13, 1974, pages 1014
- PAIN ET AL., J. IMMUNOL. METH., vol. 40, 1981, pages 219
- NYGREN, J., HISTOCHEM. AND CYTOCHEM., vol. 30, 1982, pages 407
- MORRISON ET AL., P.N.A.S. USA, vol. 81, 1984, pages 8651 - 55
- NEUBERGER, M.S. ET AL., NATURE, vol. 314, 1985, pages 268 - 270
- BOULIANNE, G.L. ET AL., NATURE, vol. 312, 1984, pages 643 - 46
- JONES, P.T. ET AL., NATURE, vol. 321, 1986, pages 522 - 525
- REICHMANN, L. ET AL., NATURE, vol. 332, 1988, pages 323 - 327
- VERHOEYEN, M ET AL., SCIENCE, vol. 239, 1988, pages 1534 - 36
- SARAGOGI ET AL., SCIENCE, vol. 253, 1991, pages 792 - 795
- POWELL ET AL., J BRIT J PHARMACOL, vol. 131, 2000, pages 875
- MENARD ET AL., J NEUROSCI, vol. 16, 1996, pages 2342
- WANG ET AL., FASEB J, vol. 23, 2009, pages 2576
- WANG ET AL., PAIN, vol. 151, 2010, pages 194
- GOODMAN, L. S.; GILMAN, A.; BRUNTON, L. L.; LAZO, J. S.; PARKER, K. L.: "Goodman & Gilman's the pharmacological basis of therapeutics", 2006, MCGRRAW-HILL
- HOWLAND, R. D.; MYCEK, M. J.; HARVEY, R. A.; CHAMPE, P. C.; MYCEK, M. J.: "Pharmacology. Lippincott's illustrated reviews", 2006, LIPPINCOTT WILLIAMS & WILKINS
- GOLAN, D. E.: "Principles of pharmacology: the pathophysiologic basis of drug therapy", 2008, LIPPINCOTT WILLIAMS & WILKINS
- "Remington's Pharmaceutical Sciences", 1995
- "Pichia Protocols (Methods in Molecular Biology Higgings)", 1998, HUMANA PRESS
- ELSOURBAGY ET AL., ENDOCRINOLOGY, vol. 139, 1998, pages 1678
- ZIMMERMAN ET AL., PEPTIDES, vol. 16, 1995, pages 421
- NATURE, vol. 313, 1985, pages 54 - 56
- BR J. CLIN. PHARMACOL., vol. 26, no. 6, 1988, pages 691 - 5
- BR. J. PHARMACOL., vol. 110, 1993, pages 772 - 776
- CHEMICAL ABSTRACTS, Columbus, Ohio, US; abstract no. 7647-14- 5
- CHEMICAL ABSTRACTS, Columbus, Ohio, US; abstract no. 51-79-6
- CHEMICAL ABSTRACTS, Columbus, Ohio, US; abstract no. 76- 74-4
- CHAPLAN ET AL., J NEUROSCI METHODS, vol. 53, 1994, pages 55 - 63
- RITCHIE, GUT, vol. 14, 1973, pages 125 - 32
- DIOP ET AL., J. PHARMACOL. EXP. THER., vol. 302, 2002, pages 1013 - 22
- FRIESE ET AL., REGUL PEPT, vol. 70, 1997, pages 1 - 7
- GSCHOSSMANN ET AL., NEUROGASTROENTEROL MOTIL, vol. 13, 2001, pages 229 - 36
- JULIA; BUENO, AM J PHYSIOL, vol. 272, 1997, pages G141 - 6
- PLOURDE ET AL., AM J PHYSIOL, vol. 273, 1997, pages G191 - 6

- CLAGUE ET AL., NEUROSCI LETT, vol. 56, 1985, pages 63 - 8
- STERNINI ET AL., GASTROENTEROLOGY, vol. 93, 1987, pages 852 - 62
- DELAFOY ET AL., GUT, vol. 55, 2006, pages 940 - 5
- AL CHAER ET AL., GASTROENTEROLOGY, vol. 119, 2000, pages 1276 - 1285
- BOURDU ET AL., GASTROENTEROLOGY, vol. 128, 2005, pages 1996 - 2008

Citation (search report)

- [I] WO 2011024113 A1 20110303 - RINAT NEUROSCIENCE CORP [US], et al
- [I] WO 2007076336 A1 20070705 - LILLY CO ELI [US], et al
- [I] WO 2007054809 A2 20070518 - RINAT NEUROSCIENCE CORP [US], et al
- [A] WO 2009109911 A1 20090911 - PFIZER LTD [GB], et al
- [A] WO 2009109908 A1 20090911 - PFIZER LTD [GB], et al
- [A] WO 2005040395 A1 20050506 - KECK GRADUATE INST [US], et al
- [IP] WO 2011156324 A1 20111215 - LILLY CO ELI [US], et al
- [A] ZELLER J ET AL: "CGRP function-blocking antibodies inhibit neurogenic vasodilatation without affecting heart rate or arterial blood pressure in the rat", BRITISH JOURNAL OF PHARMACOLOGY, WILEY-BLACKWELL, UK, vol. 155, no. 7, 1 December 2008 (2008-12-01), pages 1093 - 1103, XP002536469, ISSN: 0007-1188, DOI: 10.1038/BJP.2008.334
- [A] PESKAR B M ET AL: "A monoclonal antibody to calcitonin gene-related peptide abolishes capsaicin-induced gastroprotection", EUROPEAN JOURNAL OF PHARMACOLOGY, ELSEVIER SCIENCE, NL, vol. 250, no. 1, 30 November 1993 (1993-11-30), pages 201 - 203, XP025569068, ISSN: 0014-2999, [retrieved on 19931130], DOI: 10.1016/0014-2999(93)90645-X
- [A] TAN KEITH K C ET AL: "CALCITONIN GENE-RELATED PEPTIDE AS AN ENDOGENOUS VASODILATOR: IMMUNOBLOCKADE STUDIES IN VIVO WITH AN ANTI-CALCITONIN GENE-RELATED PEPTIDE MONOCLONAL ANTIBODY AND ITS FAB' FRAGMENT", CLINICAL SCIENCE, BIOCHEMICAL SOCIETY AND THE MEDICAL RESEARCH SOCIETY, LONDON, GB, vol. 89, no. 6, 1 January 1995 (1995-01-01), pages 565 - 573, XP009082539, ISSN: 0143-5221
- [A] JUHL ET AL: "Effect of two novel CGRP-binding compounds in a closed cranial window rat model", EUROPEAN JOURNAL OF PHARMACOLOGY, ELSEVIER SCIENCE, NL, vol. 567, no. 1-2, 24 May 2007 (2007-05-24), pages 117 - 124, XP022095320, ISSN: 0014-2999, DOI: 10.1016/J.EJPHAR.2007.04.004

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DOCDB simple family (application)

US 201213476465 A 20120521; AP 2013007259 A 20120521; AR P120101804 A 20120521; AR P200100966 A 20200406; AR P210102914 A 20211021; AU 2012258966 A 20120521; AU 2017203890 A 20170608; AU 2019226231 A 20190906; BR 112013029932 A 20120521; BR 122022012930 A 20120521; CA 2836649 A 20120521; CA 3079978 A 20120521; CA 3080000 A 20120521; CL 2013003336 A 20131120; CL 2017001379 A 20170530; CL 2018001452 A 20180530; CN 201820035733 A 20120521; CN 201710902899 A 20120521; CN 201710917266 A 20120521; CN 201810269354 A 20120521; CN 201810269398 A 20120521; CO 13275276 A 20131122; CY 211100403 T 20210511; CY 211100830 T 20210921; DK 12789693 T 20120521; DK 18203518 T 20120521; DK 19215303 T 20120521; EA 201301295 A 20120521; EA 201592042 A 20120521; EA 201891284 A 20120521; EP 12789693 A 20120521; EP 18203518 A 20120521; EP 19215303 A 20120521; EP 21159270 A 20120521; EP 22178673 A 20120521; ES 12789693 T 20120521; ES 18203518 T 20120521; ES 19215303 T 20120521; FR 22C1032 C 20220629; HR P20190640 T 20190403; HR P20210777 T 20210514; HR P20211395 T 20210902; HU E12789693 A 20120521; HU E18203518 A 20120521; HU E19215303 A 20120521; HU S2200031 C 20220622; IL 22943113 A 20131114; IL 26192718 A 20180925; IL 26846419 A 20190804; IL 27038219 A 20191103; JP 2014512923 A 20120521; JP 2017160778 A 20170824; JP 2019088960 A 20190509; KR 20137033843 A 20120521; LT 12789693 T 20120521; LT 2789693 T 20120521; LT 18203518 T 20120521; LT 19215303 T 20120521; LT PA2022511 C 20220620; MX 2013013535 A 20120521; MX 2019008185 A 20131119; MX 2019015745 A 20131119; NL 301181 C 20220613; NZ 61863712 A 20120521; NZ 71757012 A 20120521; NZ 73306012 A 20120521; PE 2013002534 A 20120521; PE 2018000036 A 20120521; PH 12018500521 A 20180309; PL 12789693 T 20120521; PL 18203518 T 20120521; PL 19215303 T 20120521; PT 12789693 T 20120521; PT 18203518 T 20120521; PT 19215303 T 20120521; RS P20190430 A 20120521; RS P20210554 A 20120521; RS P20211095 A 20120521; SG 10201604040P A 20120521; SG 2013084058 A 20120521; SI 201231586 T 20120521; SI 201231916 T 20120521; SI 201231944 T 20120521; TR 201904088 T 20120521; TW 101118029 A 20120521; TW 106121803 A 20120521; TW 107143050 A 20120521; TW 109110803 A 20120521; US 2012038844 W 20120521; US 201615257562 A 20160906; US 201815892804 A 20180209; US 201815892858 A 20180209; US 201815892892 A 20180209;

US 201815892956 A 20180209; US 201816117401 A 20180830; US 201916248284 A 20190115; US 202016740699 A 20200113;
US 202318346961 A 20230705; ZA 201308637 A 20131118